

May
2025



Co-Existence with Wildlife and its Importance

Bangalore International Airport Limited, India.

Potential hazardous birds of Aerodrome Eco system

Talon grappling

Removal of Ectoparasite

Courtship display

Expansive biome

Training on hunting lessons by mother
birds to fledglings

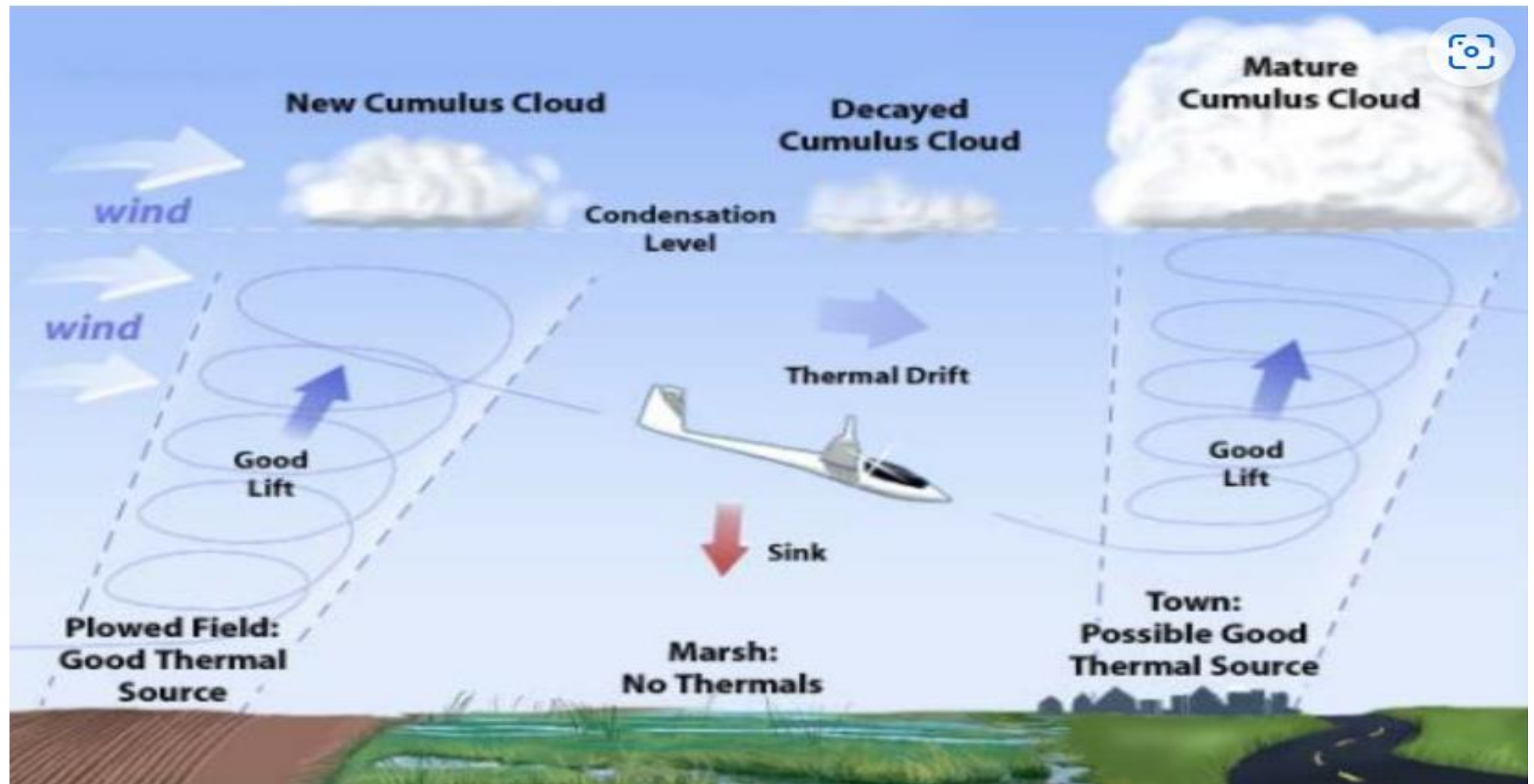
Breeding grounds of tranquility



Site fidelity



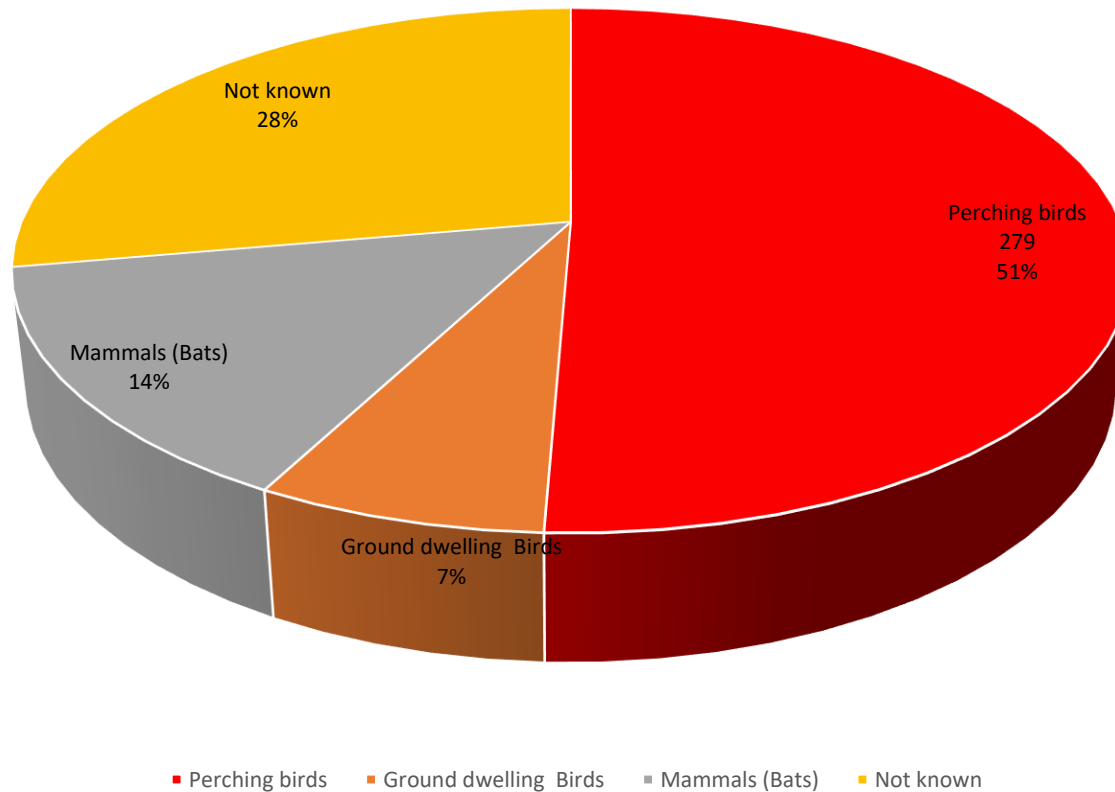
Airports – Strong thermals zones for kettling birds



Aerodrome – High thermal zone



Species involved with Wildlife strikes

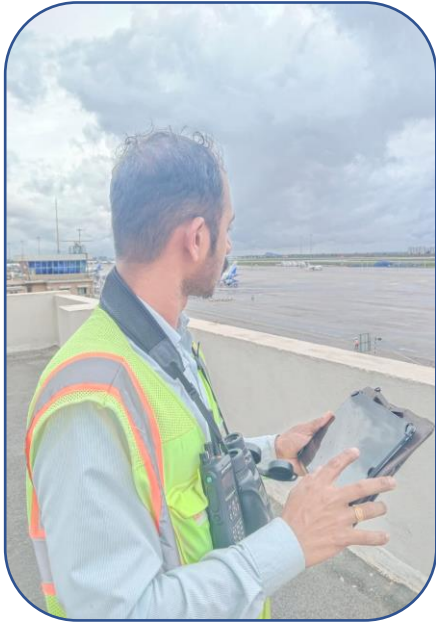


Perching birds

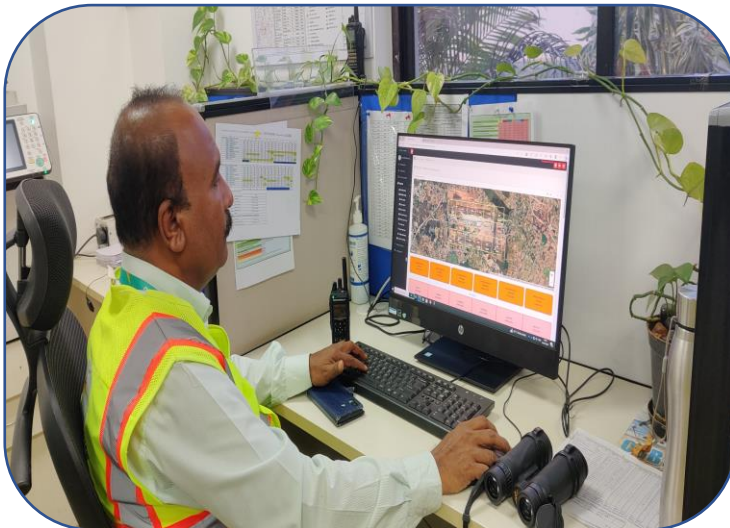
- Few of them included based on behavior (though taxonomically there are not) (Kites, Hawks, Owl, Eagle etc)
- Carnivores - 48%
- Insectivores - 29%
- Omnivorous - 13%
- Frugivorous - 10%

Integrated wildlife Hazard Management Program





Wildlife data Management



BIAL as an Ecosystem - 2019



Fauna

Birds	154 Species
Mammals	5 Species
Reptiles	15 Species
Venomous	4 Species
Amphibians	6 Species
Butterflies	49 Species

Flora

Grass	25 Species
Plants/Trees	10 Species

Biodiversity in 2024



Fauna

Birds	157 Species
Migratory	17 Species
Mammals	8 Species
Reptiles	19 Species
Venomous	4 Species
Amphibians	8 Species
Butterflies	42 Species

Flora

Grass	25 Species
Plants/Trees	10 Species

- Transformed about 2000+ acres of land
- Contour change by levelling & grading
 - Enhance water flow on surface
 - Developed green cover upto 90% area

Bird movement over - BIAL

4.2 Million birds used VOBL airspace since AOD

2.4 million Black kite movement

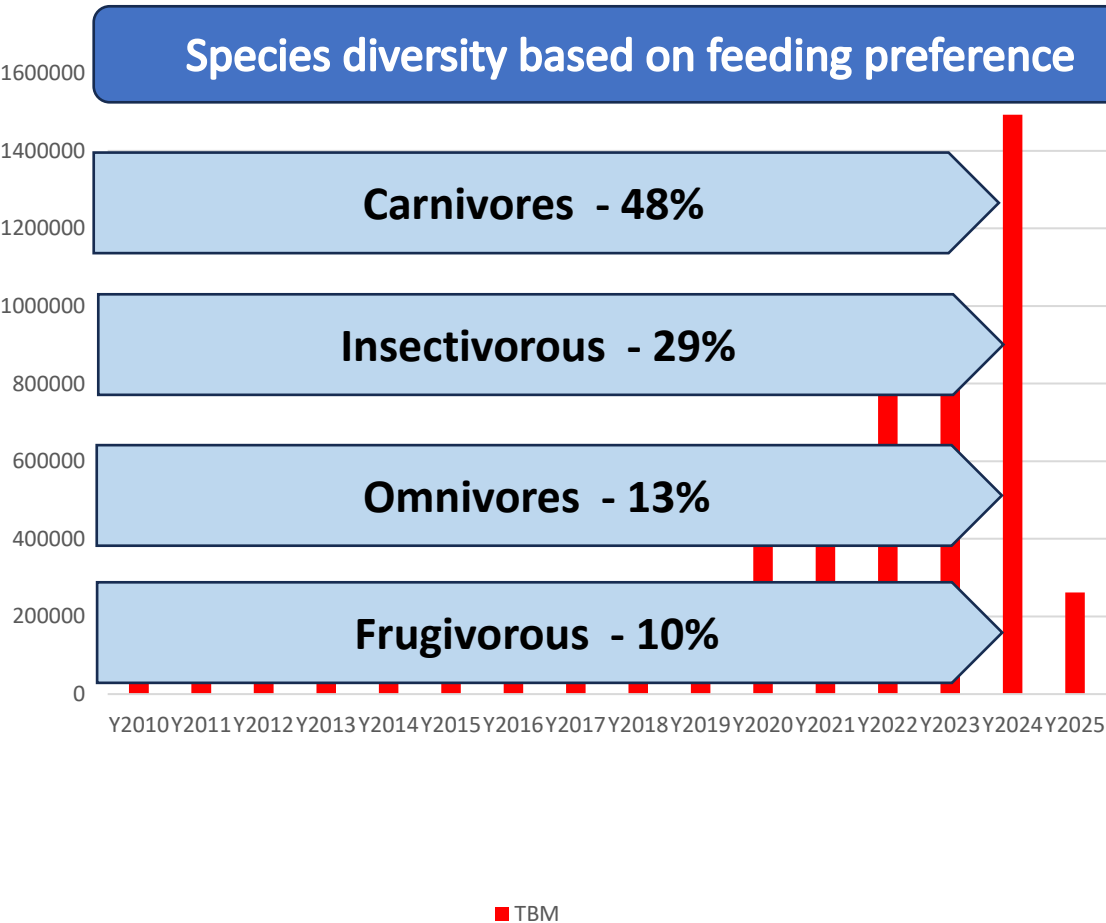
TBM – 4.2 million
TBM AM – 2.5 million
TBM PM – 1.7 million

Conflict pattern
Runway change, Juvenile outbreak, Migratory season

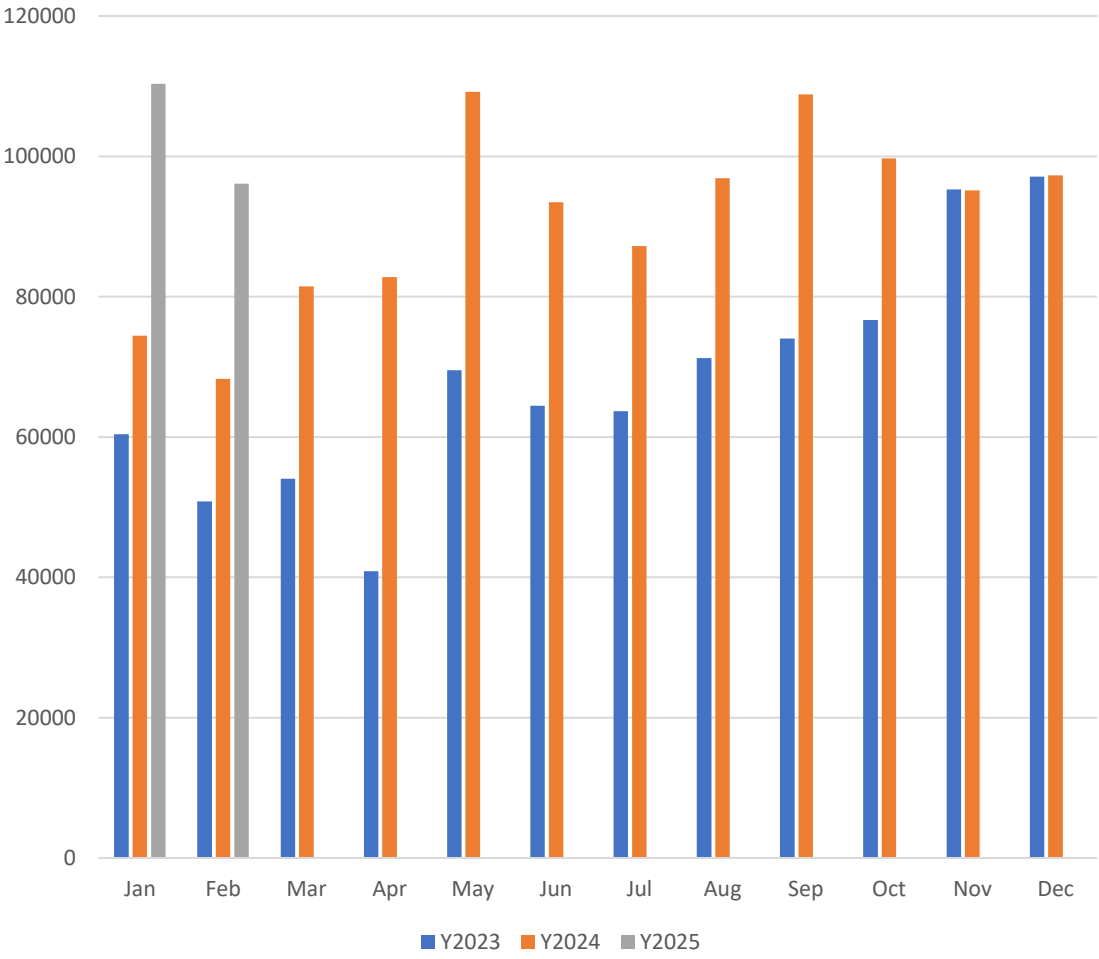


Bird movement over VOBL

Total bird movement



Potential hazardous species log



ECOLOGICAL MANAGEMENT

PHZ

PHZ

PHZ

Green bee eater
RI - UR

Owl
RI - 2

Paddy Piipet
RI - UR

Green bee eater
RI - UR

White Eyed
Buzzard
RI - UR

Kestrels
RI - 14

Black
shouldered kite
RI - 12

Black Kite
RI - 1

Wagtails
RI - UR

Swifts
RI - UR

Drongos
RI - UR

Robbin
RI - UR

Indian roller
RI - 15

Bush chat
RI - UR

Owl
RI - 2

House
Crow
RI - 3

Pigeon
RI - 8

Myna
RI - 16

Bushchat
RI - UR

Pigeon
RI - UR

Larks
RI - UR

Sparrows
RI - UR

Bablerss
RI - UR

Wagtails
RI - UR

Paddy Piipet
RI - UR

Wagtails
RI - UR

Bablerss
RI - UR

Drongos
RI - UR

Myna
RI - 16

Bush chat
RI - UR

Spotted
Dove
RI - UR

Black
shouldered kite
RI - 12

RW
Lapwing
RI - 13

Pigeon
RI - 8

Kestrels
RI - 14

Spotted Dove
RI - UR

Shikra
RI - UR

Owl
RI - 2

P Bat
RI - 6

YB Babbler
RI - UR

Black Kite
RI - 1

Drongos
RI - UR

Myna
RI - 16

RW
Lapwing
RI - 13

Cattle Egret
RI - 8

Red Piper
RI - UR

Pigeon
RI - 8

Pond Heron
RI - UR

YB Babbler
RI - UR

Cormorants
RI - UR

Cormorants
RI - UR

Purple Heron
RI - UR

Indian Roller
RI - 15

Spot billed Duck
RI - 15

Spot billed Duck
RI - 15

Black Kite
RI - 1

House
Crow
RI - 3

Pigeon
RI - 8

Spotted owl
RI - UR

Owl
RI - 2

Cattle Egret -
RI - 8

RW
Lapwing
RI - 13

Drongos
RI - UR

Airside Habitat Transformation – An Area about 600 + acres of Bare patch developed into Grass scape area



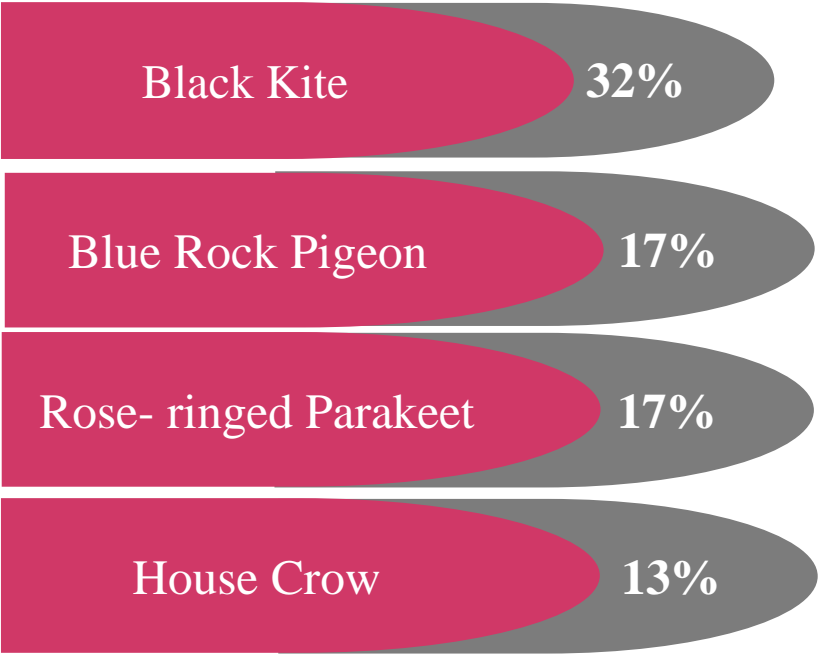
Bird movement corridors at BIAL airspace



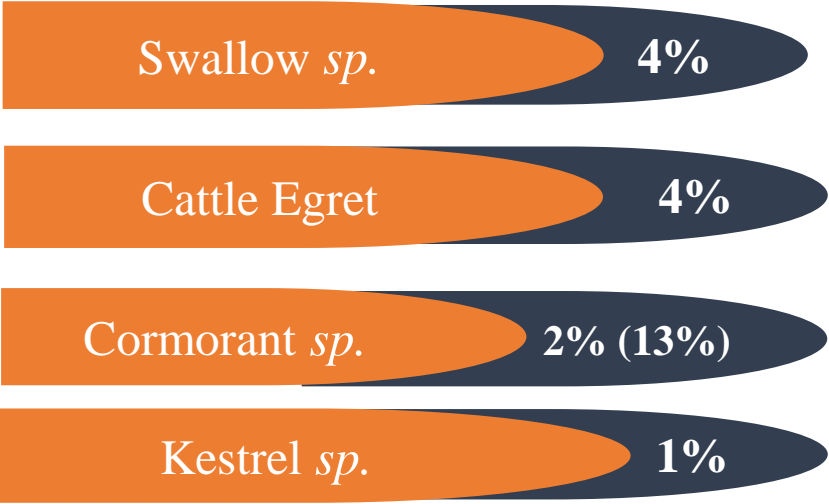
There are about 5 regular + 2 seasonal + 2 Migratory paths over BIAL Airspace
(Alerted through NOTAMs)

MAJOR BIRD MOVEMENT CORRIDORS OVER VOBL						
Species	Time	Zone		Height (feet)	Flock Size /Total	Observed from
		S Rwy	N Rwy			
BLKI	0600-1030	E-F	C-D	100-150	400+	2008
BLKI	1730-1830	E-F	C-D	100-150	250+	2008
HOCR	0630-1130	C-D	B-C	50-80	300+	2008
HOCR	1530-1800	D-E	C-D	50-80	300+	2008
RRPA	0700-0800	E-F	B-C	200-250	200+	2018
RRPA	1645-1745	F	B-C	200-250	200+	2018
ROPI	0700-1200	C-D	D-E	50-60	300+	2020
ROPI	1445-1700	C-D	D-E	50-60	300+	2020
FRBA	1835-1855	A	A	100-150	400+	2022
FRBA	0001-0400	F	F	100-150	400+	2022
CAEG(S)	0630-0830	F	E-F	100-150	200+	2014
CAEG(S)	1700-1720	E-F	F	100-150	200+	2014
ROST(M)	0600-0630	F	D-E	150-200	500	2023
ROST(M)	1745-1815	F	D-E	150-200	500	2023
LICO(S)	0730-0900	F	F	100-200	100+	2024
LICO(S)	1600-1715	F	F	100-200	100+	2024
BASW(M)	1000-1230	C-F	A-C	0-30	200+	2022
BASW(M)	1430-1600	C-F	A-B	0-30	200+	2022

Potential Hazardous



Emerging risk species

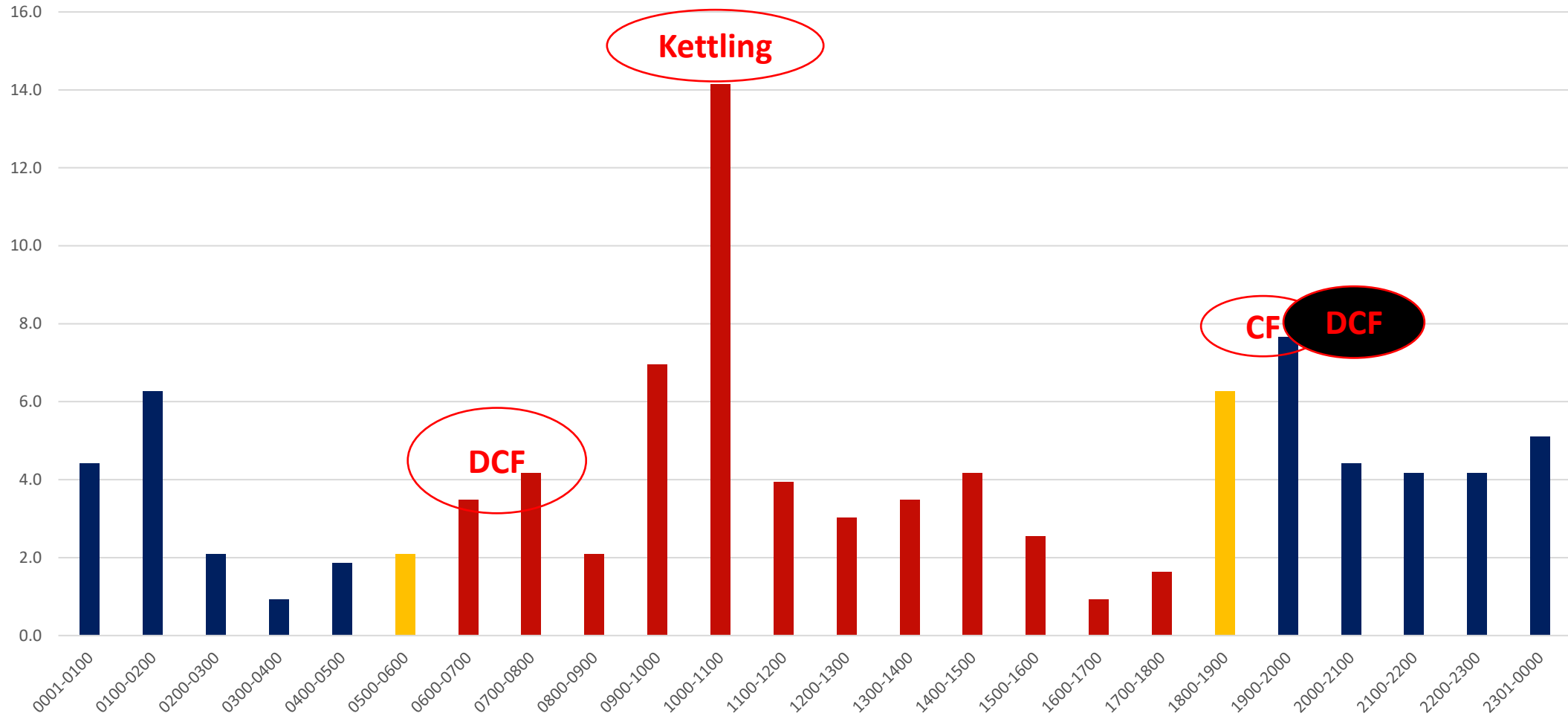


Least Hazardous Species



Bird warning period

Mean Impact Time Zone



DCF – Dispersal Commuting flight

CF – Commuting flight

Kettling - Soaring over thermals

Wildlife Hazard Ranking

			Severity of Strikes				
			Catastrophic	Critical	Moderate	Minor	Negligible
Probability of Strikes			A/C Crash & Severe Damage	A/C Crash & Light casulaty	A/C Severe Damage & No Casualty	A/C Light Damage	Near miss
Definition	Meaning	Value	A	B	C	D	E
Frequent	5/10000 movements	5	5A (Unacceptable)	5B (Unacceptable)	5C (Unacceptable)	5D(High)	5E (Moderate)
Likely	4/10000 movements	4	4A (Unacceptable)	4B (Unacceptable)	4C(Unacceptable)	4D (Moderate)	4E(Moderate)
Occassional	3/10000 movements	3	3A (Unacceptable)	3B(High)	3C ((High)	3D (Moderate)	3E (Low)
Seldom	2/10000 movements	2	2A (Unacceptable)	2B(High)	2C(Moderate)	2D (Low)	2E (Very Low)
Improbable	1/10000 movements	1	1A (Unacceptable)	1B(High)	1C (Low)	1D (Verylow)	1E (Very Low)



2008(May) - 2010

2010 - 2016

2016 - 2024

Managing Potential Hazardous Species at diverse Airport environment is a Contineous process improvement & Indecisive battle

Critical Species Management



MAC - Birds over BIAL



Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
TBM	41698	49616	114666	111776	138152	59022	76466	68026	60702	56500	73983	78776	109214	161654	188950	190195	211483	40605
TBS	13	11	9	7	7	7	3	2	1	1	1	0	2	4	8	3	1	0
%	87%	69%	90%	70%	70%	22%	14%	11%	2%	3%	3%	0%	6%	17%	20%	14%	2%	0%
RI	5D	5D	5D	5D	5D	4D	4E	4E	3E	3E	3E	2E	3E	4E	4E	4E	3E	2E

Co- existence measures - Lapwing (YWLV) (Resident)



Year	2017	2018	2019	2020	2021	2022	2023	2024	2025
TBM	2494	5363	4550	5380	6995	3059	5809	3320	424
TBS	3	0	0	2	2	1	5	2	0
%	7%			3%	9%	4%	7%	3%	

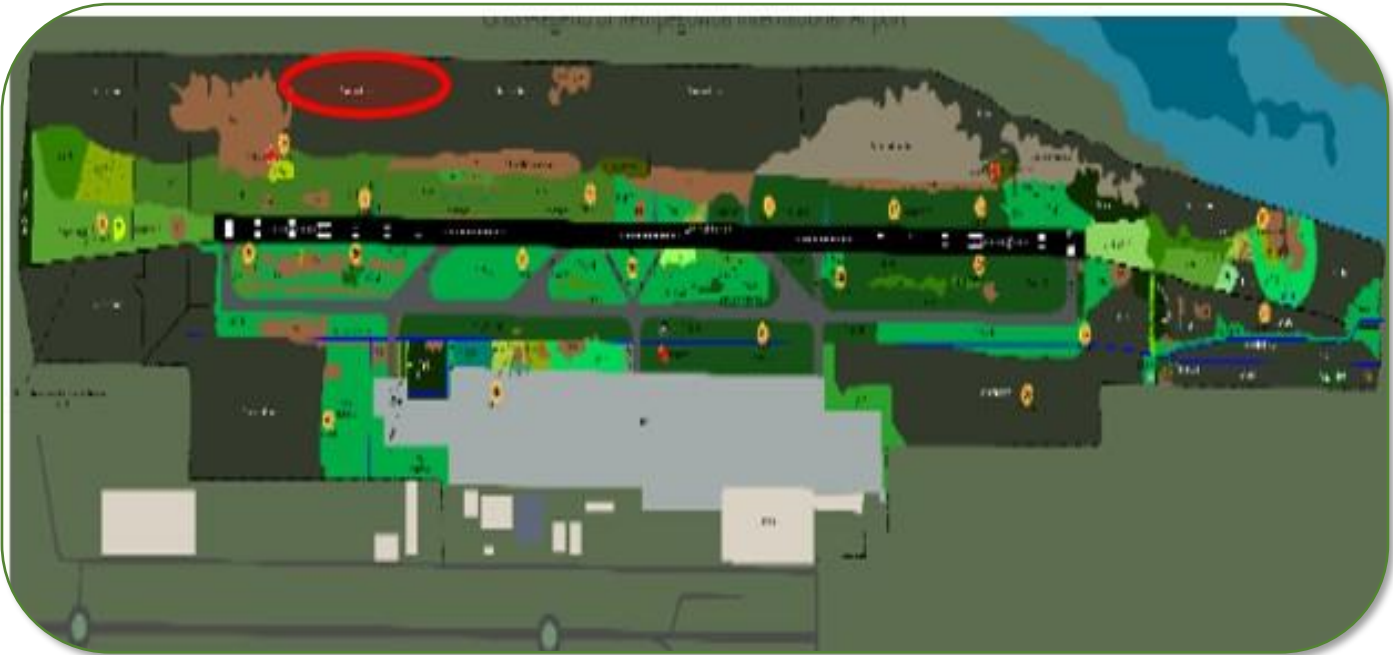
Ground dwelling birds
Visiting period – Feb – May (Peak period)
Behavior – Often moves to Critical area
Preferred roost - Tranquil areas
Note : Incident from 2023 was reported from south runway (New ecosystem)

Wildlife hazard management – Ecological management



WILDLIFE STRIKE INCIDENT DATA
WILDCAT/BLACK NAPPED HARE

Species	2016	2021	2022	2023	2024
BNH	1	1	3	1(S)	2(S)
WILD CAT	1		1	0	0



Migratory bird management (Transit route)



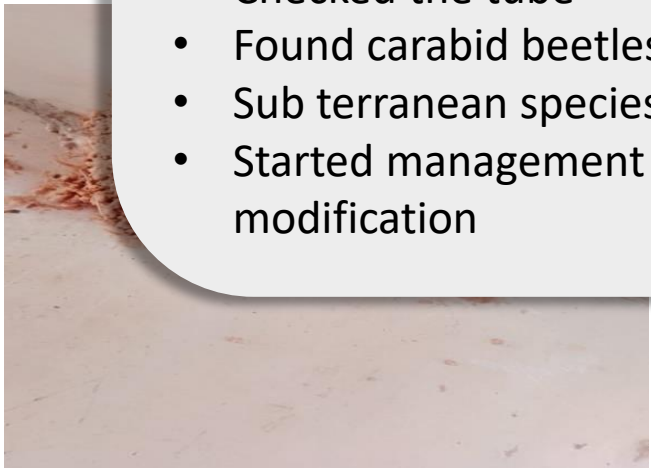
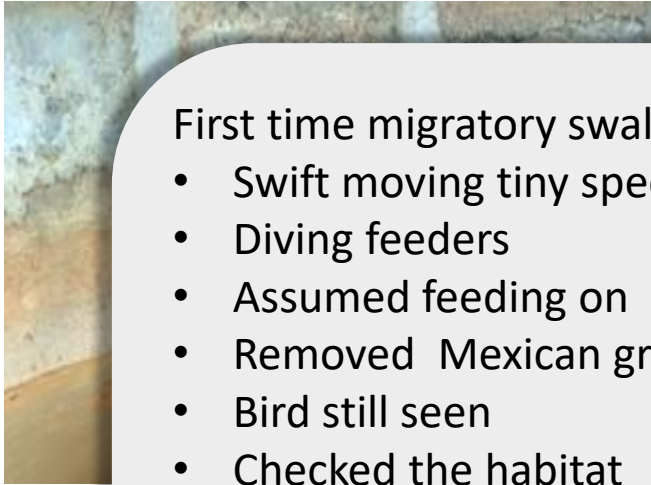
Year	2017	2018	2019	2020	2021	2022	2023	2024	2025
TBM	2494	5363	4550	5380	6995	3059	5809	3320	424
TBS	3	0	0	2	2	1	5	2	0
%	7%			3%	9%	4%	7%	3%	



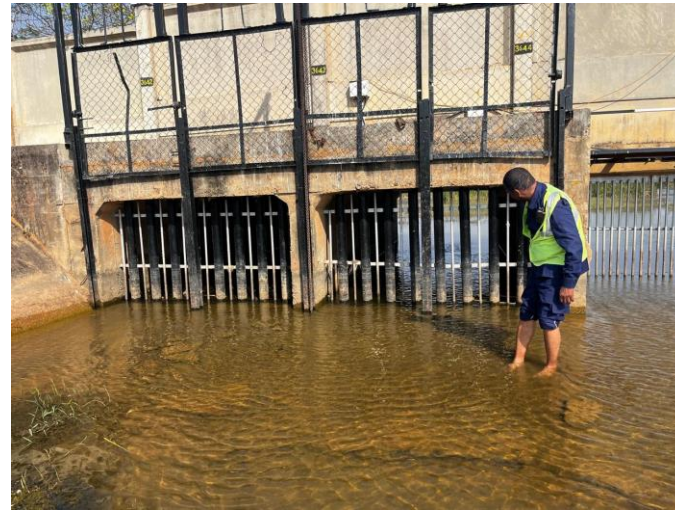
WHM – A Continuous Improvement Process

First time migratory swallows remained at airport

- Swift moving tiny species
- Diving feeders
- Assumed feeding on Winged aphids
- Removed Mexican grass from airside (1.5 tons)
- Bird still seen
- Checked the habitat
- Found them nesting
- Checked the tube
- Found carabid beetles
- Sub terranean species having multiple variants
- Started management with by nest removal and habitat modification



Proactive measures (Nest removal) – No impact on airport during 2025



Hazardous species – Black Shouldered Kite(Resident)



BLACK SHOULDERD KITE	
Category	Raptor
Airspace use	Hovering over ground mammals
Hazard Ranking	15 (others)
Airport attraction	Reptiles in plain land
Activity	Fights with invaders/gaming
Behaviour	Moving around the territory
Critical Season	All season
Deterrance	Physical deterrance
Impact on BIAL	Kites monitor & attack them once possession of prey

Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
TBM	821	3254	2344	3443	1420	1193	1693	1693	2384	2455	1440	1749	1322	1079	5531	4949	2304
BSI	1											1		1			

Hazardous species – Marsh Harrier (Local/Migratory)



MARSH HARRIER	
Category	Raptor
Airspace occupancy	Gliding/Power Flight
Hazard Ranking	10
Sources of attraction	Reptiles
Activity	Fights with invaders
Behaviour	Gliding around
Responds	Physical deterrence
Impact on BIAL	Look after the territory

Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
TBM	821	3254	2344	3443	1420	1193	1693	1693	2384	2455	1440	1749	1322	1079	5531	4949	2304
BSI	1											1		1			

Co- existence measures - Lapwing (YWLW) (Resident)



Year	2017	2018	2019	2020	2021	2022	2023	2024	2025
TBN	2454	3385	4536	5380	6995	3059	5809	3320	424
TBS	3	0	0	2	2	1	5	2	0
%	7%			3%	9%	4%	7%	3%	

Ground dwelling birds
Visiting period – Feb – May (Peak period)
Behavior – Often moves to Critical area
Preferred roost - Tranquil areas
Note : Incident from 2023 was reported from south runway

Reactive measures



Usual trap



Systemic treatment



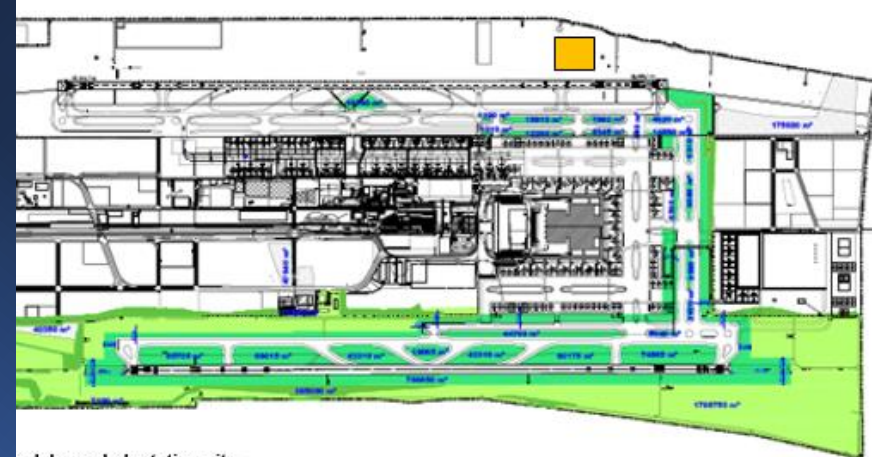
Fogging of Profenofos +
Cypermethrin



Alates – Mating season
winged ants take air into
swarms



Plantation (Exotic species)
(500+ plants in 6 acres)
(15 species preserved by regular tree nest inspection at airside area)



ndal wood plantation site

Mass insects' migration Management



Inventory of attractions – 13 Km radius from ARP

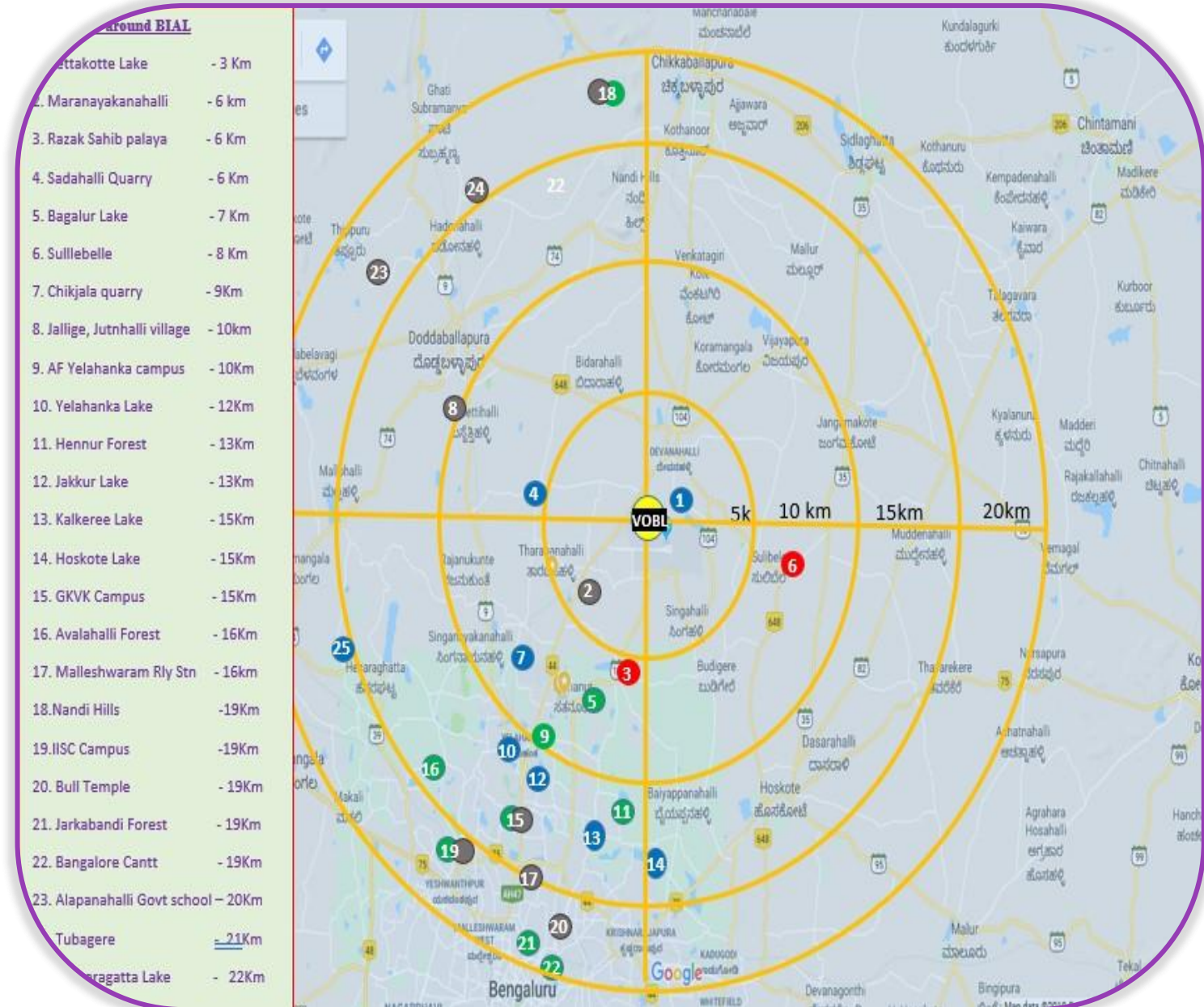
Shut down 99 illegal fish breeding ponds

Mapped about 14 bat roosts
(mitigation action on with KFD)

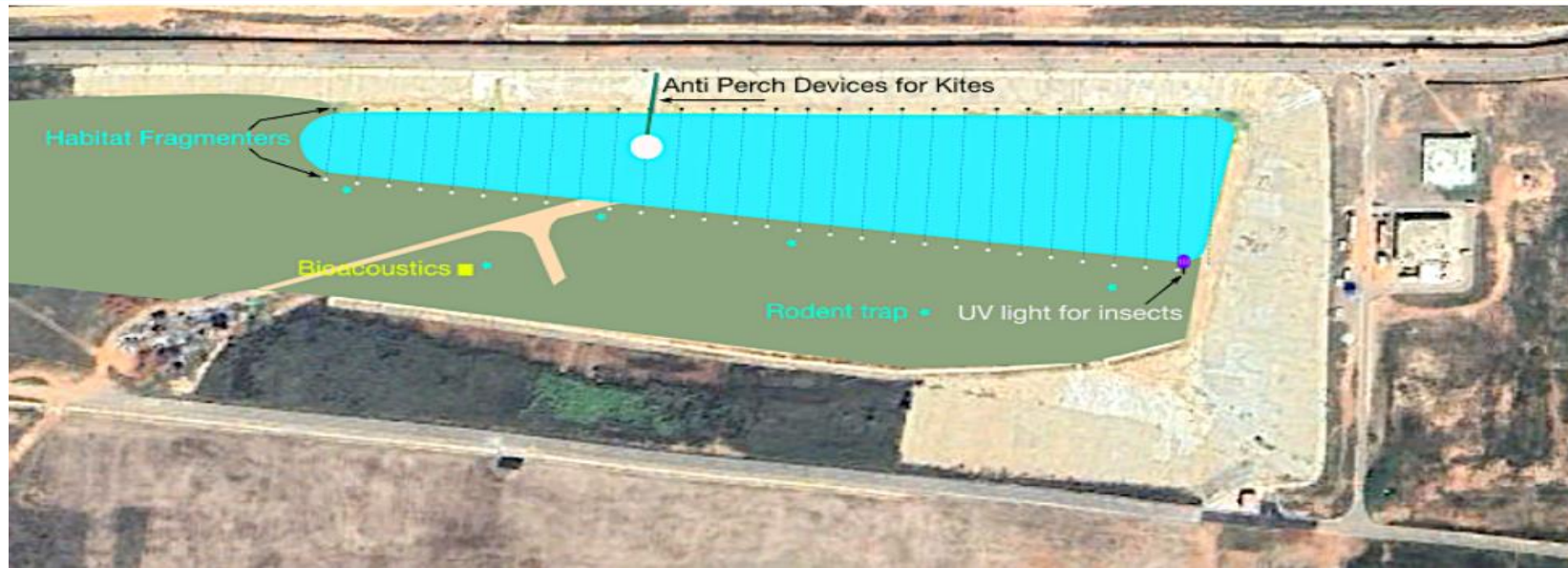
Identified about 17 bird roosts

Identify and action on refuse dumps
monthly (with support of AEMC)

Community awareness on bird hazard



Bird Hazard Mitigation measures – RWHT 4& 5





Aerodrome WHM an Indecisive battle

THANK YOU

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